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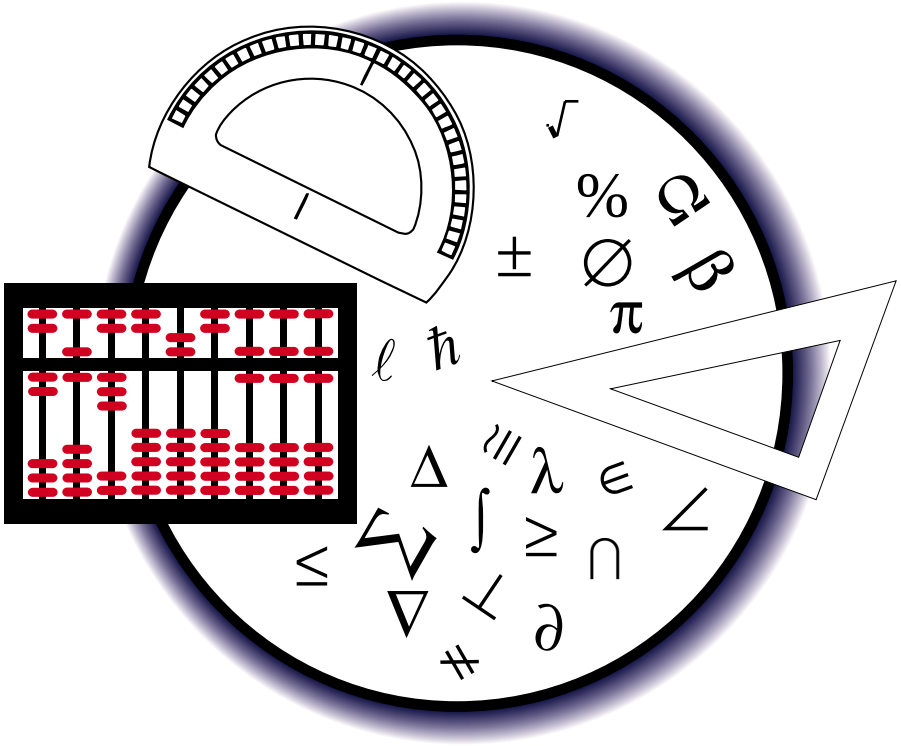
Michigan Educational Assessment Program

Released Items

from the

HST in Math Assessment



Michigan Educational Assessment Program
January 2000

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PART I
DIRECTIONS

In this test you will demonstrate your understanding of mathematics. You will have at least 80 minutes to finish the test. You will be given additional time if necessary.

Read each question carefully. You may write in your test booklet. However, you must record answers to **all** questions in your ANSWER DOCUMENT.

Use only a No. 2 pencil to mark your answers. Make a dark mark that fills the oval completely. If you change an answer, be sure to erase the first mark completely.

For the multiple-choice questions 1 through 32, choose the **BEST** answer. If you skip a question, be sure to skip the corresponding number in your ANSWER DOCUMENT. Remember, mark only one answer for each numbered question. Make sure the number of the question corresponds to the number in the answer document.

For the constructed-response questions 33 through 37, write complete and thorough answers in the spaces provided in your ANSWER DOCUMENT. Your score on the constructed-response questions will depend on how well you show your understanding of mathematics; explain your thinking; use charts, tables, diagrams, and graphs in your explanations (when appropriate); and organize your work.

Once you have finished, close your test booklet and ANSWER DOCUMENT and put down your pencil.

If you do not understand any of these directions, please raise your hand.

SAMPLE 1

A basketball player earned three times as much money this year as last year. If his contract this year was for $1.5 million, how much did he earn last year?

A $300,000 **B** $500,000

C $750,000 **D** $4,500,000

The correct answer is $500,000. You should darken oval **B** for Sample 1 on your answer sheet.

SAMPLE 2

Jasmine is doing pushups as part of her exercise program. She did 2 the first day, 3 the second day, and 5 the third day. Each day she wants to do as many pushups as she did on the previous two days combined.

A Based on the information above, how many pushups would she have to do the sixth day? Extend the pattern through day six to support your answer.

Day 3 Day 6

Pattern 2, 3, 5, 8, 13, 21

Jasmine would have to do 21 pushups the sixth day.

B Is it realistic for Jasmine to continue this program for pushups? Explain your answer. You may extend the pattern further to support your explanation.

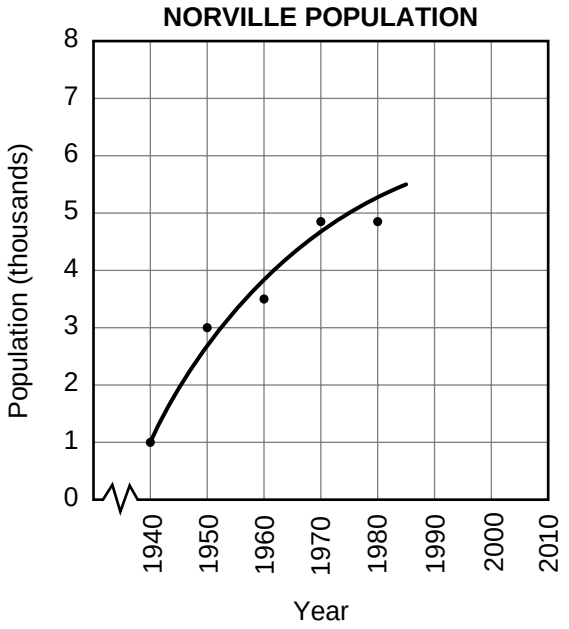
Day 3 Day 6 Day 10 Day 12

Pattern 2, 3, 5, 8, 13, 21, 34, 55, 89, 144, 233, 377

No, because as the days continue, the combining of the previous two days' number of pushups will start to become excessively large for the average person to do.

For example: Day 10 would be 144 pushups and Day 12 would be 377 pushups if the pattern continued.

1 The population growth of Norville is shown on the graph below. The points on the graph show the town's population for 1940 to 1980.



A best-fit curve of the population growth has been added to the graph. Based on the continuation of the curve shown, which of the following is the **BEST** prediction of Norville's population in the year 2010?

A 2500 to 4000

B 4000 to 5500

C 5500 to 7000

D 7000 to 8500

2 Carlos started driving at 11:00 A.M., and reached his destination at 1:30 P.M. If his average speed was 60 miles per hour, how far did Carlos travel?

A 90 miles

B 150 miles

C 570 miles

D 970 miles

3 Which of the following statements must **ALWAYS** be true?

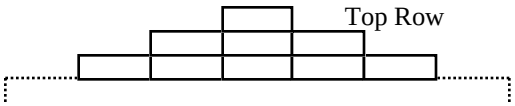
A The upper quartile is always greater than or equal to the mean.

B The upper quartile is always greater than or equal to the median.

C The median is always greater than or equal to the mean.

D The mean is always greater than or equal to the median.

4 Bricks were stacked in the pattern shown below. If the pattern continued and there were 49 bricks in all, how many bricks would be on the bottom row?



A 11 **B** 12

C 13 **D** 14

5 A student clean-up committee collected 120 empty drink containers. There were three times as many of the 5¢ deposit containers as 10¢ deposit containers. How many 10¢ deposit containers were collected?

A 30 **B** 40

C 60 **D** 90

6 To estimate the total number of trout in a lake, the Department of Natural Resources catches 200 trout, tags them, and returns them to the lake. After one week, 200 more trout are caught. If 8 of these trout are found to be tagged, which of the following is the **BEST** approximation of the total number of trout in the lake?

A 1,600 **B** 5,000

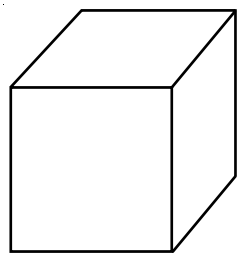
C 40,000 **D** 320,000

7 A coin purse contains one penny, one nickel, one dime, and two quarters. There is a probability of zero that two coins taken at random will have a total value of _____.

A 11¢ **B** 13¢

C 15¢ **D** 26¢

8 If the volume of a cube with side s is 64 cubic centimeters, what is the surface area of the cube?



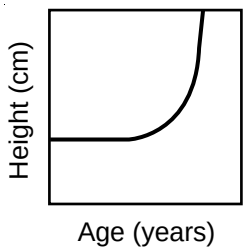
s

A 48 cm^2 **B** 64 cm^2

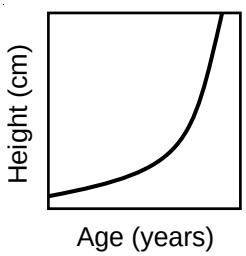
C 96 cm^2 **D** 144 cm^2

9 Which of the following line graphs would **BEST** represent the relationship between a person's age and height?

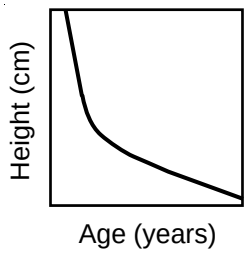
A



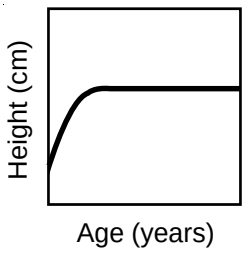
B



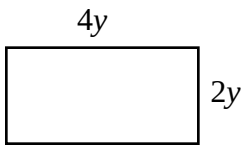
C



D



10 Which expression represents the area of a rectangle with the dimensions shown in the figure?



A $8y^2$

B $12y^2$

C $12y$

D $8y$

11 When Vita delivers newspapers she rides her bike one mile east, two miles south, two miles east, and then two miles south. If Vita can ride directly home along a straight line at the end of her route, how far must she ride to return to her starting point?

A 4 miles **B** 5 miles

C 7 miles **D** 8 miles

12 Class begins at 8:15 A.M. If Paul needs 35 minutes to walk to school and 5 minutes to go to his locker before entering class, what is the latest time he can leave his house without being late?

A 7:35 A.M. **B** 7:40 A.M.

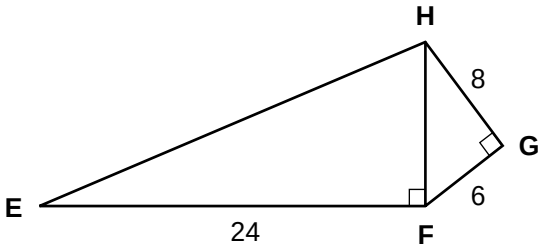
C 8:35 A.M. **D** 8:55 A.M.

13 A store owner is trying to sell a TV set originally priced at $450. The owner marks the price up 20% and then advertises a 20% sale on the marked-up price. What is the final price of the TV set?

A $360 **B** $432

C $450 **D** $540

14 What is the perimeter of quadrilateral EFGH?



A 62 **B** 64

C 68 **D** 72

15 In a class of s students, 10 received a grade of A and 16 received a grade of B. If a student is chosen at random, which expression gives the probability that the student received **NEITHER** an A nor a B?

A $\frac{6}{s}$ **B** $\frac{10}{16}s$

C $\frac{s-26}{s}$ **D** $\frac{26}{s}$

16 The equation for the curve shown in Figure 1 is $y = x^2$. Which of the following equations **BEST** represents the curve shown in Figure 2 ?

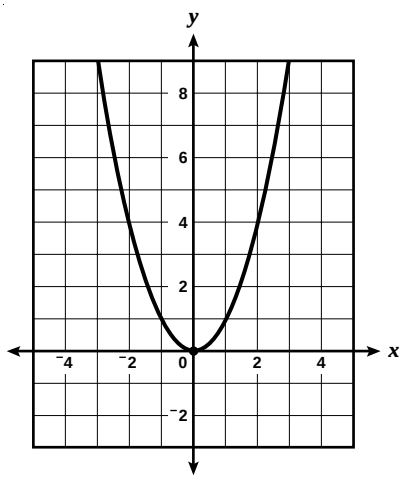


Figure 1

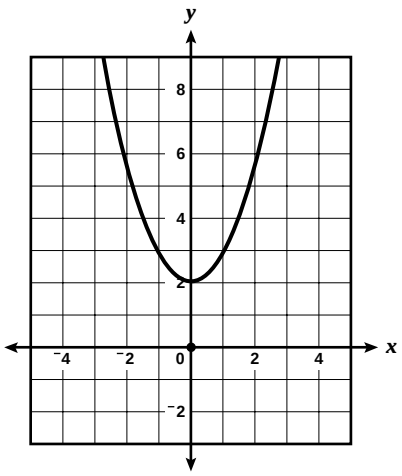


Figure 2

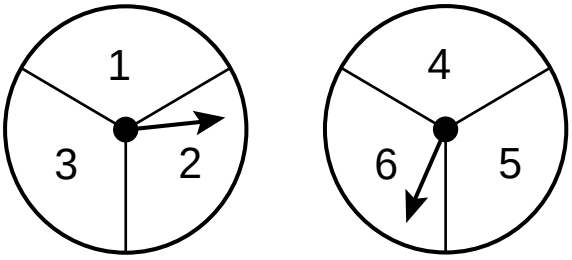
A $y = \frac{x^2}{2}$ **B** $y = 2x^2$ **C** $y = x^2 + 2$ **D** $y = x^2 - 2$

Selected Response Answer Key

1	C
2	B
3	B
4	C
5	A
6	B
7	B
8	C
9	D
10	A
11	B
12	A
13	B
14	B
15	C
16	C
17	Constructed Response

17 (4 Points)

In a game at the school carnival, you spin each spinner one time and then add the two numbers the arrows land on. The sum of the numbers determines your prize.



A Make a table listing all of the possible spinner results and the sums that could appear.

B What is the probability that the sum is an even number? Justify your answer. You may use your list from Part A to support your answer.

17. <u>KEY ELEMENTS: (4 Points)</u>

PART A (2 Points)

2 Points = Table with 9 or 18 correct variations of the spinners with no incorrect variations

1 Point = Table with 7 or 8 correct variations
OR
Table with 9 correct variations with some correct variations repeated and no incorrect variations

0 Points = Other

Part B (2 Points)

2 Points = Correct probability
AND
Correct justification

1 Point = Correct probability that sum is even with no justification
OR
Correct probability that sum is odd with a justification
OR
Incorrect probability with correct justification

0 Points = Other

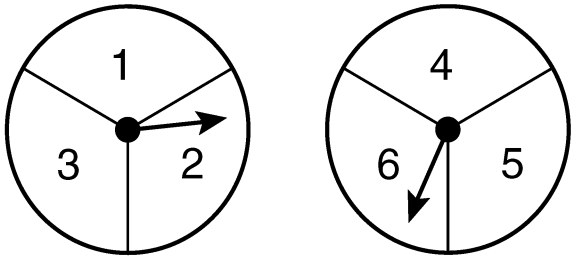
<u>NOTES:</u>

An incorrect variation is one that cannot occur on these two spinners (e.g.l,1 or 6,6).

Part B is dependent on Part A. Score Part B as correct if it is based on using incorrect data from Part A.

17 (4 Points)

In a game at the school carnival, you spin each spinner one time and then add the two numbers the arrows land on. The sum of the numbers determines your prize.



A Make a table listing all of the possible spinner results and the sums that could appear.

I	II	sum
1	4	5
1	5	6
1	6	7
2	4	6
2	5	7
2	6	8
3	4	7
3	5	8
3	6	9

B What is the probability that the sum is an even number? Justify your answer. You may use your list from Part A to support your answer.

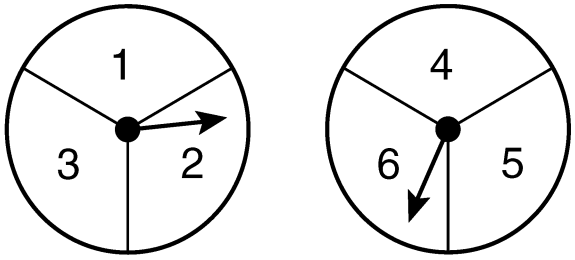
5 - 1
6 - 2
7 - 3
8 - 2
9 - 1

even 6 & 8 → 4 times
odd 5, 7, 9 → 5 times

∴ 44.4%, 4 out of 9

17 (4 Points)

In a game at the school carnival, you spin each spinner one time and then add the two numbers the arrows land on. The sum of the numbers determines your prize.



A Make a table listing all of the possible spinner results and the sums that could appear.

1 + 4 = 5
1 + 5 = 6
1 + 6 = 7
2 + 4 = 6
2 + 5 = 7
2 + 6 = 8

3 + 4 = 7
3 + 5 = 8
3 + 6 = 9

B What is the probability that the sum is an even number? Justify your answer. You may use your list from Part A to support your answer.

P(sum is an even #) = 4 of 9

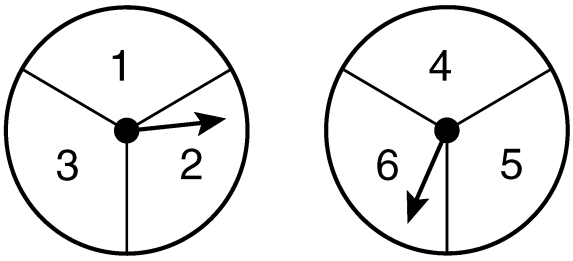
There are 9 possibilities of sums only 4 of them are even. so 4 of 9.

G1 Score Point: 4

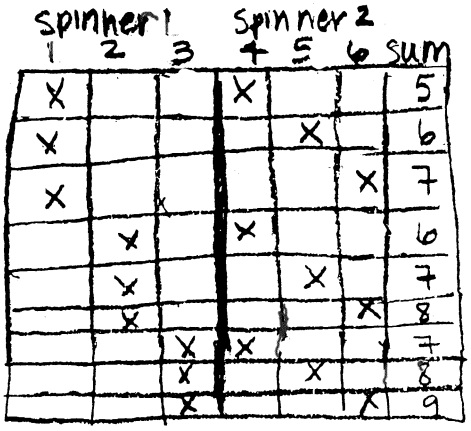
This response provides a list of 9 correct variations of the spinners and their sums with no incorrect variations in Part A. A list is equivalent to a table. There is also a correct expression for the probability that the sum will be even (4 out of 9) and a correct justification (9 possible sums and only 4 are even) in Part B. The circled even sums in Part A, alone, would also provide a justification for Part B. Therefore, this response merits full credit.

17 (4 Points)

In a game at the school carnival, you spin each spinner one time and then add the two numbers the arrows land on. The sum of the numbers determines your prize.



A Make a table listing all of the possil le spinner results and the sums that could appear.



B What is the probability that the sum is an even number? Justify your answer. You may use your list from Part A to support your answer.

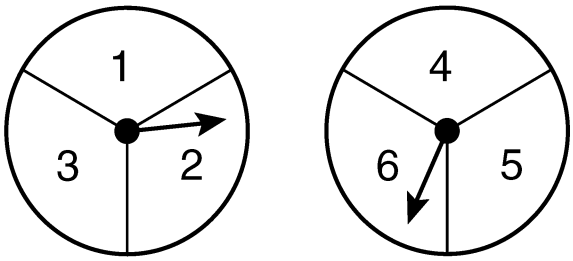
The propability that the sum will be even is $\frac{4}{9}$ or $\approx 44\%$ This is because out of nine possible answers, 4 are even and five are odd.

G2 Score Point: 4

This response provides a table showing 9 correct variations of the spinners and their sums with no incorrect variations in Part A. There is also a correct expression for the probability that the sum will be even (4/9 or 44%) and a correct justification (out of 9 possibilities, 4 are even) in Part B. Therefore, this response merits full credit.

17 (4 Points)

In a game at the school carnival, you spin each spinner one time and then add the two numbers the arrows land on. The sum of the numbers determines your prize.



A Make a table listing all of the possible spinner results and the sums that could appear.

	4	5	6
1	1+4	1+5	1+6
2	2+4	2+5	2+6
3	3+4	3+5	3+6

2 1 2
1 2 1

B What is the probability that the sum is an even number? Justify your answer. You may use your list from Part A to support your answer.

4/9

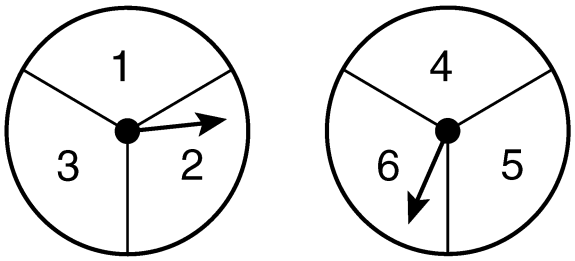
There are 9 possible sums, and four of those nine would be even, and five of the nine would be ~~neg~~ odd.

G3 Score Point: 4

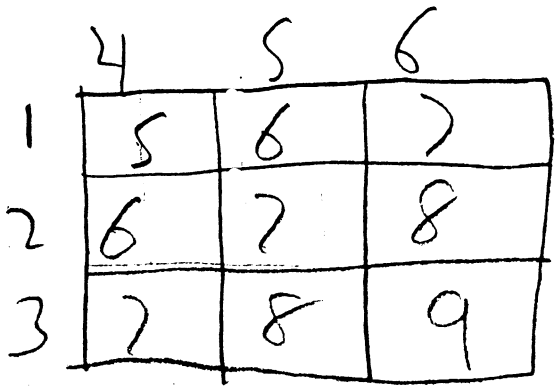
This response provides a table showing 9 correct variations of the spinners with no incorrect variations in Part A. The sums of these combinations do not need to be included. There is also a correct expression for the probability that the sum will be even (4/9) and a correct justification (4 of the 9 variations are even) in Part B. Therefore, this response merits full credit.

17 (4 Points)

In a game at the school carnival, you spin each spinner one time and then add the two numbers the arrows land on. The sum of the numbers determines your prize.



A Make a table listing all of the possible spinner results and the sums that could appear.



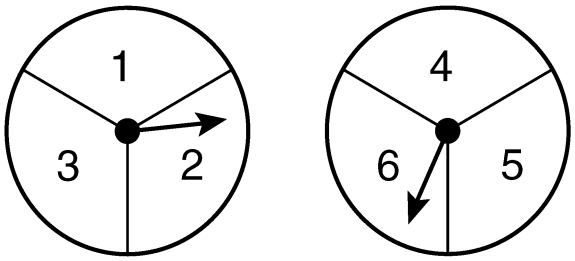
B What is the probability that the sum is an even number? Justify your answer. You may use your list from Part A to support your answer.

4 in 9 is the probability
Because, even numbers line up
with only other even numbers
to form even numbers.

G4 Score Point: 3
This response provides a table showing 9 correct variations of the spinners and their sums with no incorrect variations in Part A. There is also a correct expression for the probability that the sum will be even (4 in 9). The justification remains too unclear. This justification needs to be correct for this response to merit full credit.

17 (4 Points)

In a game at the school carnival, you spin each spinner one time and then add the two numbers the arrows land on. The sum of the numbers determines your prize.



A Make a table listing all of the possible spinner results and the sums that could appear.

1,4 - odd
1,5 - even
1,6 - odd
2,1 even
2,5 odd
2,6 even
3,4 odd
3,5 even
3,6 odd

Possible spinner results	
EVEN	ODD
1,5 = 6	1,4 = 5
2,4 = 6	1,6 = 7
2,6 = 8	2,5 = 7
3,5 = 8	3,4 = 7
	3,6 = 9

B What is the probability that the sum is an even number? Justify your answer. You may use your list from Part A to support your answer.

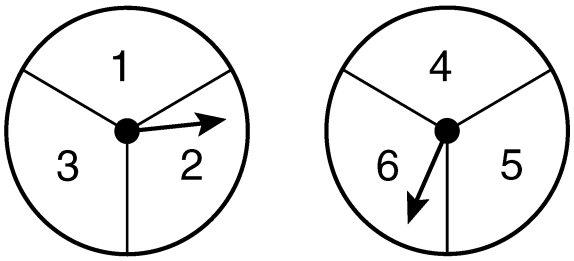
there is about a 6590 chance the sum will be odd. 5/9 of the answers are odd. The person at the carnival will have a greater possibility of the sum of the 2 numbers adding up to be an odd number.

G5 Score Point: 3

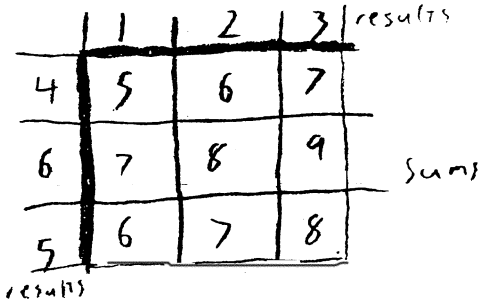
This response provides a table showing 9 correct variations of the spinners and their sums with no incorrect variations in Part A. There is also a correct expression for the probability that the sum will be odd (5/9) and a correct justification (the separate columns to present even and odd sums in the Part A table) for Part B.

17 (4 Points)

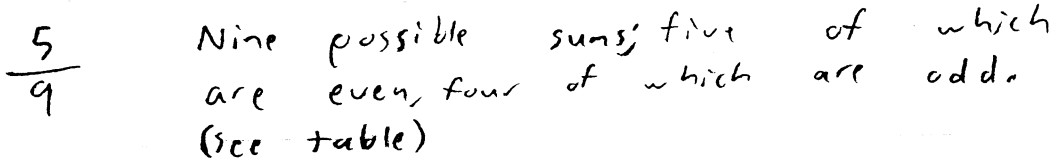
In a game at the school carnival, you spin each spinner one time and then add the two numbers the arrows land on. The sum of the numbers determines your prize.



A Make a table listing all of the possible spinner results and the sums that could appear.



B What is the probability that the sum is an even number? Justify your answer. You may use your list from Part A to support your answer.

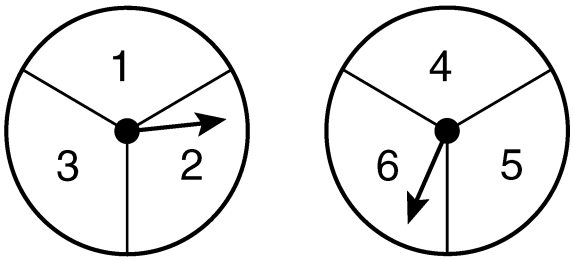


G6 Score Point: 2

This response provides a table showing 9 correct variations of the spinners and their sums with no incorrect variations in Part A. There is also an incorrect expression for the probability that the sum will even (5/9) and a justification that supports this incorrect probability in Part B. These mistakes are not based on incorrect data from Part A and, therefore, are not forgiven to prevent double jeopardy (see rubric note). Either the probability or the justification would need to be correct for this response to merit more credit.

17 (4 Points)

In a game at the school carnival, you spin each spinner one time and then add the two numbers the arrows land on. The sum of the numbers determines your prize.



A Make a table listing all of the possible spinner results and the sums that could appear.

6
5
7
6
7
9
8

B What is the probability that the sum is an even number? Justify your answer. You may use your list from Part A to support your answer.

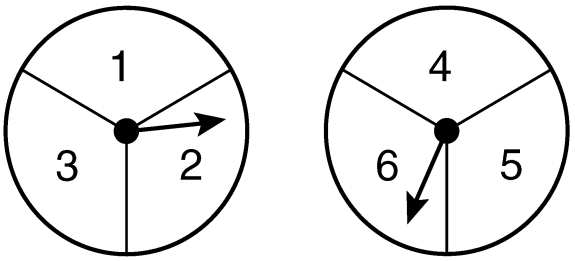
3/7 there are 7 numbers and 3 of them are even

G7 Score Point: 2

This response provides no correct variations of the spinners in Part A. Instead, it merely lists 7 possible sums; there should be 9 sums. In this context, it is also not clear whether the sums of 6 are due to variations 1,5 and 5,1 or 1,5 and 2,4. The expression of probability that the sum will be even (3/7) and its justification (3 out of 7 numbers are even) are correct in Part B. They are based on incorrect data from Part A and, therefore, are forgiven to prevent double jeopardy (see rubric note).

17 (4 Points)

In a game at the school carnival, you spin each spinner one time and then add the two numbers the arrows land on. The sum of the numbers determines your prize.



A Make a table listing all of the possible spinner results and the sums that could appear.

5	6	7	8	9
1+4	4+2	4+3	4+2	6+3
	1+5	6+1	5+3	

B What is the probability that the sum is an even number? Justify your answer. You may use your list from Part A to support your answer.

2/5

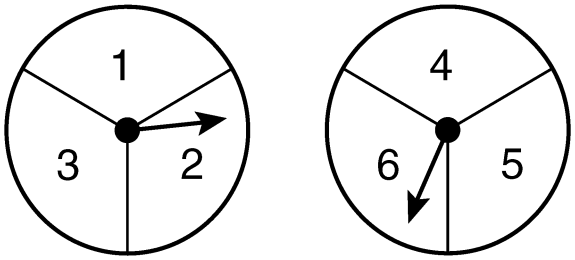
Because only 2 sets of numbers add up evenly in this spinning game the other 3 are odd answers. Therefore, the probability of a sum of even numbers is 2/5.

G8 Score Point: 1

This response provides a table showing 8 correct variations of the spinners and their sums in Part A (the variation of 2+5 is missing). There is only an incorrect expression of the probability that the sums will be even (2/5) and an incorrect justification (only 2 sets of numbers add up evenly) in Part B. These mistakes are not based on incorrect data from Part A but on a misconception arising from the use of sums rather than the number of variations of the spinners.

17 (4 Points)

In a game at the school carnival, you spin each spinner one time and then add the two numbers the arrows land on. The sum of the numbers determines your prize.



A Make a table listing all of the possible spinner results and the sums that could appear.

B What is the probability that the sum is an even number? Justify your answer. You may use your list from Part A to support your answer.

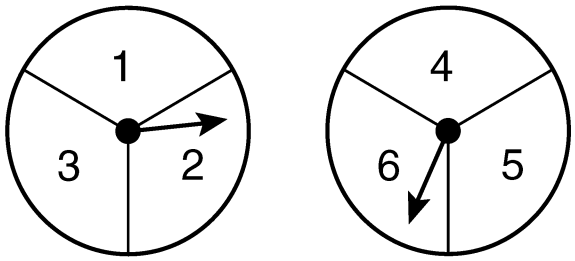
$\frac{4}{9}$

G9 Score Point: 1

This response provides no correct variations of the spinners in Part A. There is a correct expression for the probability that the sums will be even (4/9), but there is no justification for this probability. Either the correct variations need to be provided in Part A or a correct justification for the probability needs to be given in Part B for this response to merit more credit.

17 (4 Points)

In a game at the school carnival, you spin each spinner one time and then add the two numbers the arrows land on. The sum of the numbers determines your prize.



A Make a table listing all of the possible spinner results and the sums that could appear.

5 6 7
6 7 8
7 8 9

B What is the probability that the sum is an even number? Justify your answer. You may use your list from Part A to support your answer.

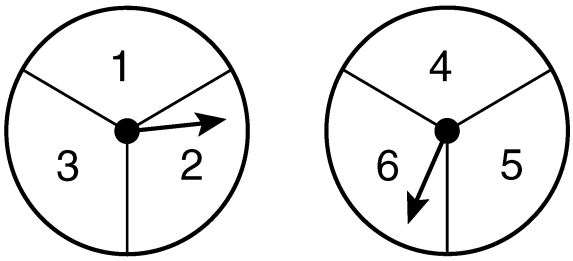
very little because there are only 2 even numbers a 6 + a 8.

G10 Score Point: 0

This response provides no correct variations of the spinners in Part A. Instead, it merely lists 9 possible sums. There is also no correct expression of the probability that the sums will be even (very little) and no correct justification (only 2 even numbers) in Part B. At least one of these elements needs to be present for this response to merit some credit.

17 (4 Points)

In a game at the school carnival, you spin each spinner one time and then add the two numbers the arrows land on. The sum of the numbers determines your prize.



A Make a table listing all of the possible spinner results and the sums that could appear.

#1	#2	=	#1	#2	=
1	4	5	3	6	9
2	5	7	2	5	7
3	6	9	1	4	5
2	5	7	3	6	9
1	4	5	1	4	5
3	6	9	2	5	7
2	5	7	1	4	5
3	6	9	3	6	9
1	4	5	2	5	7

B What is the probability that the sum is an even number? Justify your answer. You may use your list from Part A to support your answer.

You have 40% chance that the sum will be an even number because the only to even sums are 4 or 4, out of 5 numbers.

G11 Score Point: 0

This response provides only 3 correct variations of the spinners and their sums in Part A (1/4, 2/5, and 3/6). There is no correct expression of the probability that the sums will be even (40% chance) and no correct justification (because there are only two even sums out of 5) in Part B. These mistakes are not based on incorrect data from Part A, where none of the possible sums shown are even, and, therefore, are not forgiven to prevent double jeopardy (see rubric note).